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ORIGINAL ARTICLE

Index cholecystectomy for management of acute gallstone disease: a change of practice at a major New Zealand metropolitan centre

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Abstract

Objectives: This study aimed to examine the effects of a change in practice in index cholecystectomy on waiting lists at a New Zealand metropolitan hospital.

Methods: Patients presenting with gallstone disease from January 2004 to October 2010 were identified. Data on acute and elective cholecystectomies were collated and analysed for length of stay. Waiting lists for cholecystectomy were compared.

Results: During the study period, 3999 patients were admitted with acute gallbladder disease. The median number of admissions decreased from 49 to 40 per month ($P < 0.01$). The median number of index cholecystectomies increased from three to 22 per month ($P < 0.01$). Total monthly bed days for all cholecystectomies decreased from 175 days to 124 days ($P < 0.01$), but only median postoperative bed days for acute cholecystectomy showed a similar trend, decreasing from 4 days to 3 days ($P < 0.01$). The number of patients on the waiting list decreased from 334 in January 2004 to 132 in January 2006 as a result of government-imposed cuts. The number of patients wait-listed for elective cholecystectomy remained unchanged.

Conclusions: An increasing number of index cholecystectomies have been performed at this centre. An effect on waiting list numbers is yet to be shown, but the wait list has not ballooned to previous numbers, although the number of patients joining the wait list remains unchanged. Monthly bed days have decreased for all patients with acute gallstone disease, probably in response to a combination of the changes implemented.

Keywords

cholelithiasis, index cholecystectomy, waiting lists, cholecystitis

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Introduction

There is accumulating evidence that the definitive management of patients admitted with acute gallstone disease should involve cholecystectomy during index admission.[1–5] Several meta-analyses have shown that early vs. delayed cholecystectomy for cholecystitis does not increase risk for mortality or morbidity, rates of conversion to open procedures[1–5] or rates of bile duct injury.[3,4] Furthermore, length of hospital stay is shorter in patients undergoing early cholecystectomy,[1–5] occasionally at the expense of longer operation times.[3,5] For patients presenting with biliary colic, index cholecystectomy decreased morbidity which would otherwise occur during the waiting period for elective cholecystectomy.[6] In biliary pancreatitis, current guidelines recommend the definitive management of gallstones within 2 weeks if not at index admission.[7] Finally, index cholecystectomy is at least cost-neutral[8] or may be cost-effective[9] and rates of readmission are also reduced.[1]

Despite these data, index cholecystectomy figures have remained low, both in New Zealand[10,11] and abroad,[12–15] although this pattern may be changing.[16–18] Notably, two New Zealand metropolitan hospitals, Middlemore and Christchurch Public

Hospitals, have shown increased rates of index cholecystectomy for management of acute gallstone disease of 67% and 78%, respectively.[16,17]

Traditionally, the provision of acute services has been undervalued in New Zealand, where the Ministry of Health (MoH) places a focus on elective surgical procedures with regard to the provision of surgical services. This continues despite the admission of approximately 6000 acute cases and 4000 elective cases at this centre (Christchurch Public Hospital) annually. Multiple admissions that result from delays in the definitive management of acute gallstone disease contribute to district health board expenses without the added value of care for the patient.[10,17] This paper reports an audit of the number of elective and acute cholecystectomies carried out at Christchurch Public Hospital over a 6.5-year period and discusses its findings with respect to the effects on elective waiting lists of a changing practice to index cholecystectomy.

Materials and methods

All patients who underwent cholecystectomy (International Classification of Diseases, 10th revision [ICD-10] code 965) from January 2004 to October 2010 were identified from the Canterbury District Health Board patient management system. Data were subsequently divided into those for either elective or acute procedures and analysed over time as described below.

Numbers of patients presenting during the same period with acute gallbladder-related pathology were identified by ICD-10 code as follows: cholelithiasis (k80x), including choledocholithiasis with or without cholangitis; cholecystitis (k81x), and acute biliary pancreatitis (k85.1). The median number of bed days per month were calculated (data for two complex elective patients admitted in May 2009 and April 2010, respectively, whose inpatient stays exceeded 100 days, were excluded from the analysis). Total monthly bed days were calculated by summing the length of stay of patients present at a midnight census.

Waiting lists were examined for the same timeframe. These are shown as the number of patients awaiting cholecystectomy at the end of each calendar month. The numbers of patients added to the waiting lists per month were also obtained; sources of referral for these included only ward referrals for those admitted under the Department of General Surgery and from Christchurch Women's Hospital.

Data are displayed and analysed using run charts. The centreline is a moving median with a step change trend shown as indicated on each graph. This is obtained by plotting the median of all raw values on each graph. A step change trend is detected when seven graphed values are either all above or all below the median line; the likelihood of this occurring by chance alone is < 0.01. This value is obtained by simple probability calculations: the likelihood of a point occurring either above or below the median line is 1 in 2 (0.5). The probability of this occurring seven times in a row is 0.5^7 or 1 in 128, which represents a P-value of <0.01. Missing data were excluded from the analysis.

Ethical approval was not required as this study met the definition of an audit and quality assurance-related activity as outlined in the guidelines published by the New Zealand National Ethics Advisory Committee.[19]

Results

Between January 2004 and October 2010, 3999 patients were admitted with acute gallbladder-related pathology to Christchurch Public Hospital (Fig. 1). Over this period, 2659 laparoscopic or open cholecystectomies were performed, of which 1162 (44%) were acute (Fig. 2) and 1497 (56%) were elective cholecystectomies. The median number of patients admitted with acute gallbladder-related pathology initially increased from 49 to 50 per month ($P < 0.01$) in August 2005 and then decreased to 40 ($P < 0.01$) in August 2008.

The median number of index cholecystectomies performed per month increased from three in 2004 to 22 in 2010 ($P < 0.01$) (Fig. 2), whereas the median number of elective cholecystectomies performed per month decreased from 18 to 12 over the same period ($P < 0.01$; data not shown). The total number of patients awaiting elective cholecystectomy (on waiting lists) at the end of each calendar month decreased markedly with waiting list cuts and has since stabilized (Fig. 3). The median number of patients added each month to cholecystectomy waiting lists remained unchanged over time (data not shown).

For acute cholecystectomy, median monthly postoperative bed days decreased over time from 4 days to 3 days ($P < 0.01$) (Fig. 4). No change was detected in postoperative monthly bed days for elective cholecystectomy and no trends were detected in median

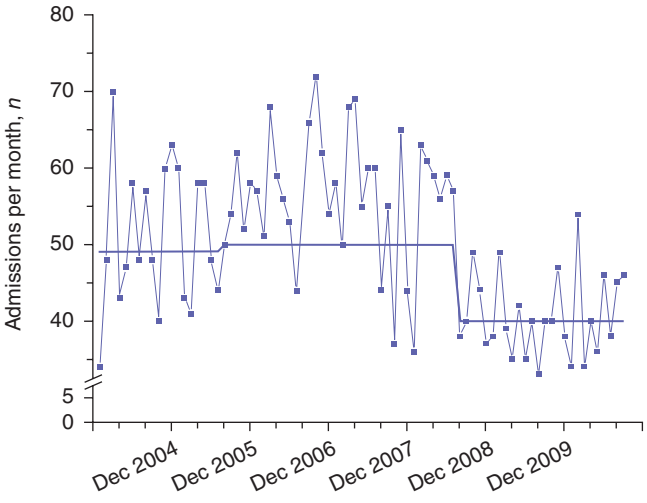

Figure 1 Numbers of patients presenting per month with acute gallbladder-related pathology. The solid horizontal line represents the centreline. Missing data are excluded

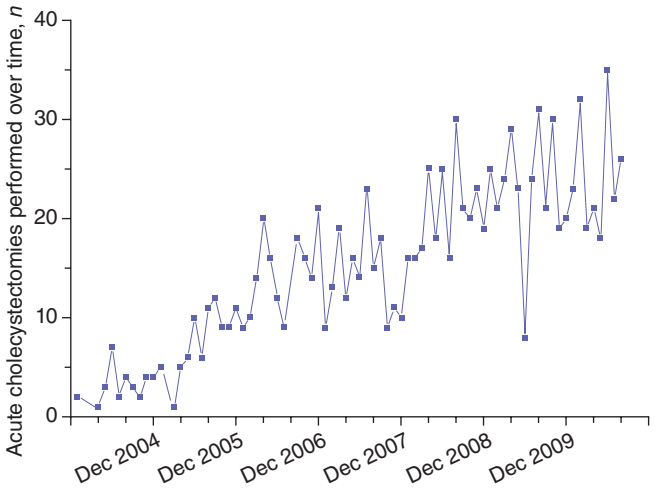

Figure 2 Numbers of acute cholecystectomies performed per month over time

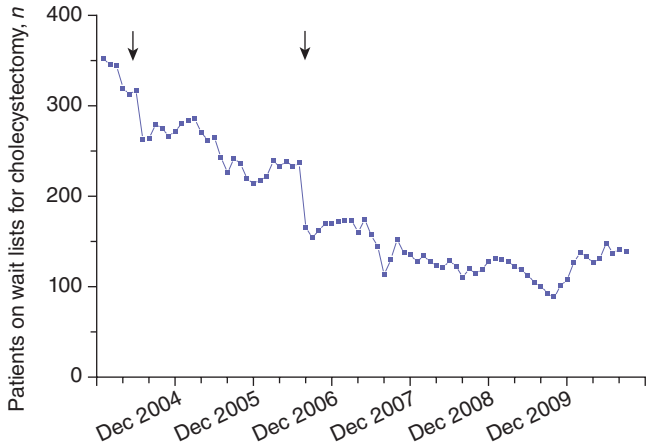

Figure 3 Numbers of patients waiting for cholecystectomy at the end of each calendar month. Waiting list culls (arrows) are evident in May 2004 and July 2006

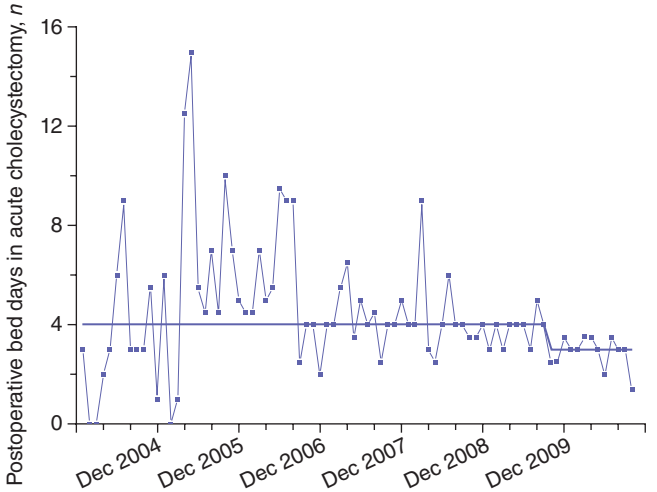

Figure 4 Median monthly postoperative bed day analysis for acute cholecystectomy. The solid horizontal line represents the centreline. Missing data are excluded. No trends emerged in data for elective procedures (data not shown) or median monthly preoperative acute or elective cholecystectomies (data not shown)

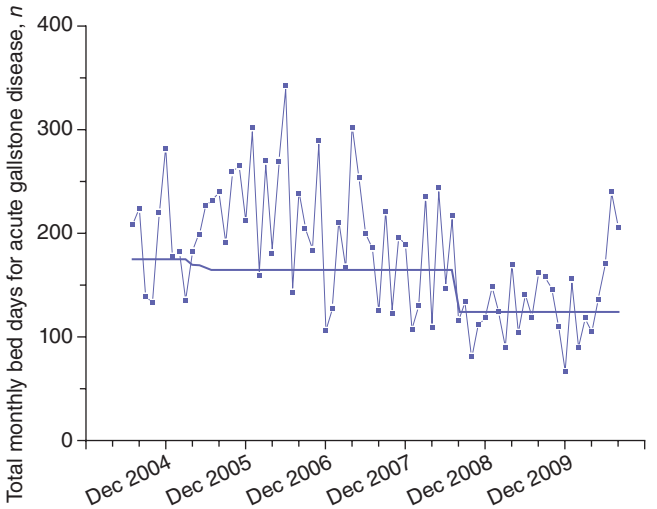

Figure 5 Total monthly total bed day analysis for acute gallstone disease patients. The solid horizontal line represents the centreline. Missing data are excluded

monthly preoperative bed day analysis for either acute or elective cholecystectomy (data not shown).

For all patients admitted with acute gallstone disease, total monthly bed days decreased over time from 175 days to 124 days ($P < 0.01$) (Fig. 5). Inclusion of the two complex elective patients whose inpatient stays exceeded 100 days (in May 2009 and April 2010) did not alter the analysis (data not shown).

Discussion

Since March 2005, an increasing number of acute cholecystectomies have been performed at the Department of General Surgery, Christchurch Public Hospital. Given that the number of patients presenting with acute gallbladder-related pathology has, in fact, decreased over time (Fig. 1), the greater number of acute procedures is likely to reflect a clinician-driven change in practice with regard to index cholecystectomy previously noted at this centre.[17] This change in practice has been entirely driven by clinicians through the implementation of level 1 clinical evidence and has not involved any increase in government funding of either acute or elective surgical services; thus it has maximized the value of the scarce health care dollar.

The impact of this change in practice has almost certainly contributed to the eventual decrease in the number of

people presenting with acute gallbladder-related pathology (Fig. 1) as such pathology is definitively managed at index admission. It is also likely to have contributed to a decrease in the number of elective cholecystectomies performed, albeit that the number of patients joining the waiting list has remained static.

It is uncertain how this change has affected absolute numbers on elective cholecystectomy waiting lists as the reductions seen (Fig. 3) would appear to have resulted solely from government-directed elective wait list culls executed in May 2004 and July 2006. Over half of the patients waiting for cholecystectomy were removed from waiting lists (which numbered 334 patients in January 2004 and 209 patients in January 2006) and returned to the care of their general practitioners. After the first cull, a step increase in the number of patients admitted with acute gallstone disease occurred (Fig. 1, from August 2005), probably reflecting an increase in the burden of biliary disease in the community which was not dealt with by lagging elective services. This step increase occurred despite the early adoption of index cholecystectomy at Christchurch Public Hospital. With time, a new steady state was achieved, in which fewer people were admitted with acute gallbladder-related pathology (Fig. 1, August 2008) and thus perhaps the change in practice may have prevented waiting lists from ballooning to the numbers seen in May 2004.

Total monthly bed days for all biliary disease patients have decreased over time, indicating overall benefits not only to patients, but also to the hospital. The introduction of a dedicated surgical assessment and review area (SARA) at Christchurch Public Hospital in March 2008 has been previously shown to have reduced hospital stay and improved inefficiencies in all acute surgical admissions.[20] This is not reflected in the preoperative bed day analysis for patients undergoing index cholecystectomy, in which time to acute theatre admission appears unchanged. The reduction in readmission rates brought about by a change in the practice of index cholecystectomy[10,17] is probably also reflected in the decrease in total monthly bed use. Postoperative bed day analysis for this group has decreased over time, reflecting patterns in the incidence of day-case laparoscopic cholecystectomy, which has been shown to be safe in selected elective patients.[21]

The increase in the number of index cholecystectomies performed at this centre reflects a clinician-driven change in practice. This has improved access to publicly funded surgery and benefits both patients and hospitals. An effect on waiting lists is yet to be shown, but waiting lists have not ballooned to previous numbers and the number of patients added to waiting lists has remained unchanged. Monthly bed days are decreasing for all acute gallstone disease patients, probably in response to combinations of the introduction of SARA, fast-tracked postoperative recovery and reduced presentations of acute gallstone disease as patients undergo definitive management earlier.

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Conflicts of interest

None declared.

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